

WEST Search History

DATE: Thursday, September 01, 2005

| Hide? | <u>Set</u> <u>Name</u> | <u>Query</u> | <u>Hit</u> <u>Count</u> |
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| | | <i>DB=USOC; PLUR=YES; OP=ADJ</i> | |
| <input type="checkbox"/> | L15 | L13 and (second adj drying) | 2 |
| <input type="checkbox"/> | L14 | L13 with (second adj drying) | 0 |
| <input type="checkbox"/> | L13 | (process\$ or dry\$ or clean\$ or rins\$) with (semiconductor\$ or wafer) | 4798 |
| | | <i>DB=PGPB; PLUR=YES; OP=ADJ</i> | |
| <input type="checkbox"/> | L12 | US-20010007259-A1.did. | 1 |
| | | <i>DB=USPT; PLUR=YES; OP=ADJ</i> | |
| <input type="checkbox"/> | L11 | US-6375758-B2.did. | 1 |
| <input type="checkbox"/> | L10 | US-6375758-B2.did. | 1 |
| | | <i>DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i> | |
| <input type="checkbox"/> | L9 | L8 and (second adj drying) | 10 |
| <input type="checkbox"/> | L8 | (process\$ or dry\$ or clean\$ or rins\$) with (semiconductor\$ or wafer) | 162868 |
| | | <i>DB=PGPB,USPT; PLUR=YES; OP=ADJ</i> | |
| <input type="checkbox"/> | L7 | L5 and (second adj drying) | 17 |
| <input type="checkbox"/> | L6 | L5 and (second adj fluid) | 32 |
| <input type="checkbox"/> | L5 | L4 and alcohol | 855 |
| <input type="checkbox"/> | L4 | L3 and nitrogen | 2085 |
| <input type="checkbox"/> | L3 | (process\$ or dry\$ or clean\$ or rins\$) and l1 | 7434 |
| <input type="checkbox"/> | L2 | (process\$ or dry\$ or clean\$ or rins\$) | 3140862 |
| <input type="checkbox"/> | L1 | (134/26 or 134/21 or 134/36 or 134/37 or 134/19 or 134/902 or 34/60 or 34/78) | 7577 |

END OF SEARCH HISTORY

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Search Results - Record(s) 1 through 10 of 17 returned.

☐ 1. Document ID: US 20050178402 A1

Using default format because multiple data bases are involved.

L7: Entry 1 of 17

File: PGPB

Aug 18, 2005

PGPUB-DOCUMENT-NUMBER: 20050178402

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20050178402 A1

TITLE: Methods and apparatus for cleaning and drying a work piece

PUBLICATION-DATE: August 18, 2005

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|----------------------|-------------|-------|---------|---------|
| Stowell, R. Marshall | Wilsonville | OR | US | |
| Cleary, Tim | Portland | OR | US | |
| Janicki, Michael J. | West Linn | OR | US | |
| Dinneen, Mark | Portland | OR | US | |

US-CL-CURRENT: 134/1.3; 134/148, 134/153, 134/183, 134/186, 134/25.4, 134/33,
134/902

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KIMC | Draw. Da |
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☐ 2. Document ID: US 20040163683 A1

L7: Entry 2 of 17

File: PGPB

Aug 26, 2004

PGPUB-DOCUMENT-NUMBER: 20040163683

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040163683 A1

TITLE: Substrate processing apparatus for drying substrate

PUBLICATION-DATE: August 26, 2004

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|-------------------|-------|-------|---------|---------|
| Sugimoto, Hiroaki | Kyoto | | JP | |
| Okuda, Seiichiro | Kyoto | | JP | |
| Hashizume, Akio | Kyoto | | JP | |

US-CL-CURRENT: [134/56R](#); [134/105](#), [134/113](#), [134/148](#), [134/157](#), [134/902](#), [134/94.1](#)

ABSTRACT:

A substrate processing apparatus includes a container in which a heating plate, a discharge nozzle for discharging a vapor of organic solvent, and a discharge nozzle for supplying a process gas and a cooling gas are provided. A pump in communication with an exhaust outlet of the container exhausts an atmosphere from the container to reduce pressure in the container. Therefore, the substrate processing apparatus is capable of performing (1) the process of drying a substrate in a reduced-pressure atmosphere by the use of the vapor of organic solvent, and (2) the process of drying the substrate in the reduced-pressure atmosphere by heating, to thereby efficiently dry the substrate.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
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☐ 3. Document ID: US 20040016442 A1

L7: Entry 3 of 17

File: PGPB

Jan 29, 2004

PGPUB-DOCUMENT-NUMBER: 20040016442

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040016442 A1

TITLE: Megasonically energized liquid interface apparatus and method

PUBLICATION-DATE: January 29, 2004

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|-------------------|--------|-------|---------|---------|
| Cawlfeld, B. Gene | Dallas | TX | US | |

US-CL-CURRENT: [134/1.3](#); [134/102.1](#), [134/186](#), [134/30](#), [134/902](#)

ABSTRACT:

Apparatus and method for removing material adhering to a workpiece are disclosed. A process liquid and a discontinuous phase are placed in a process tank adapted to receive a workpiece. The interface between the process liquid and the discontinuous phase is energized with megasonic energy, and the interface is contacted with and moved relative to the workpiece in a linear direction at a controlled rate, preferably across all of the workpiece. Liquid in the interface is optionally removed from the process tank at predetermined times to remove entrained particles. Numerous drying schemes can be used to reduce or eliminate formation of droplets and to speed drying time.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
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☐ 4. Document ID: US 20020007844 A1

L7: Entry 4 of 17

File: PGPB

Jan 24, 2002

PGPUB-DOCUMENT-NUMBER: 20020007844
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020007844 A1

TITLE: Cleaning processing method and cleaning processing apparatus

PUBLICATION-DATE: January 24, 2002

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|---------------------|--------------|-------|---------|---------|
| Orii, Takehiko | Nirasaki-shi | | JP | |
| Nakamori, Mitsunori | Nirasaki-shi | | JP | |

US-CL-CURRENT: 134/30; 134/105, 134/33, 134/902, 134/95.2, 134/95.3, 134/98.1,
134/99.1

ABSTRACT:

Where a substrate such as a semiconductor wafer held in a process space in a process chamber consisting of an outside chamber and an inside chamber is subjected to a cleaning processing, a chemical agent such as IPA or a solvent having a surfactant added thereto is supplied in the form of a mist or a vapor toward the substrate under the state that the substrate is stopped or rotated at a low speed after processing with a chemical agent and a subsequent rinsing processing with a pure water. After the supply of the chemical agent is stopped, the substrate is rotated at a rotating speed higher than said low speed so as to centrifugally remove the chemical agent attached to the substrate.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|----------|
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☐ 5. Document ID: US 20010037822 A1

L7: Entry 5 of 17

File: PGPB

Nov 8, 2001

PGPUB-DOCUMENT-NUMBER: 20010037822
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20010037822 A1

TITLE: Vapor drying system and method

PUBLICATION-DATE: November 8, 2001

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|---------------|----------|-------|---------|---------|
| Elsawy, Tamer | Boise | ID | US | |
| Hall, R. Mark | Meridian | ID | US | |
| Butler, Josh | Kuna | ID | US | |

US-CL-CURRENT: 134/30; 134/28, 134/902, 134/95.2, 134/98.1

ABSTRACT:

The present apparatus is a method and system for treating and drying the surface of an object. According to the described method, with a wet object positioned in a vessel, a drying vapor is introduced into the vessel. The drying vapor condenses on the surface of the object and reduces the surface tension of the residual process fluid, causing the residual process fluid to flow off of the surface. In one embodiment, wet processing of the object and a subsequent evacuation of process fluid is carried out in the vessel prior to introduction of the drying vapor.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw D |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|--------|
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☐ 6. Document ID: US 20010007259 A1

L7: Entry 6 of 17

File: PGPB

Jul 12, 2001

PGPUB-DOCUMENT-NUMBER: 20010007259

PGPUB-FILING-TYPE: new-utility

DOCUMENT-IDENTIFIER: US 20010007259 A1

TITLE: CLEANING AND DRYING METHOD AND APPARATUS FOR OBJECTS TO BE PROCESSED

PUBLICATION-DATE: July 12, 2001

INVENTOR-INFORMATION:

| NAME | CITY | STATE | COUNTRY | RULE-47 |
|--------------------|---------------|-------|---------|---------|
| NAKASHIMA, SATOSHI | KIKUSUI-MACHI | | JP | |
| KAMIKAWA, YUJI | KOSHI-MACHI | | JP | |
| HONDA, KAZUYUKI | TOSU-SHI | | JP | |

US-CL-CURRENT: 134/32; 134/61, 134/902

ABSTRACT:

A cleaning and drying apparatus includes a cleaning bath 22 for collecting cleaning liquid and also discharging the liquid, a drying chamber 23 arranged above the cleaning bath 22 and a wafer boat 24 for conveying semiconductor wafers W between the cleaning bath 22 and the drying chamber 23. Dry gas nozzles 37 for ejecting dry gas are provided in the drying chamber 23. A shutter 36 is arranged between the cleaning bath 22 and the drying chamber 23, for insulating the cleaning bath 22 from the drying chamber 23. A central processing unit 60 controls respective operations of the dry gas nozzles 37 and a driving unit 52 for the shutter 36. With the arrangement, after the wafers W have been cleaned in the cleaning bath 22, the cleaning liquid is discharged through a bottom of the bath 22, while the dry gas is supplied from the dry gas nozzles 37 to contact with surfaces of the wafers W and the cleaning liquid in a first drying process. Next, a second drying process is carried out due to condensation of the cleaning liquid on the wafers and the dry gas. In this way, the improvement in drying efficiency and the reduction of consumed dry gas can be accomplished.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw D |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|--------|
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☐ 7. Document ID: US 6863741 B2

L7: Entry 7 of 17

File: USPT

Mar 8, 2005

US-PAT-NO: 6863741

DOCUMENT-IDENTIFIER: US 6863741 B2

TITLE: Cleaning processing method and cleaning processing apparatus

DATE-ISSUED: March 8, 2005

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|---------------------|----------|-------|----------|---------|
| Orii; Takehiko | Nirasaki | | | JP |
| Nakamori; Mitsunori | Nirasaki | | | JP |

US-CL-CURRENT: 134/30; 134/102.1, 134/153, 134/33, 134/34, 134/37, 134/902,
134/95.1, 134/95.3, 134/99.1

ABSTRACT:

Where a substrate such as a semiconductor wafer held in a process space in a process chamber consisting of an outside chamber and an inside chamber is subjected to a cleaning processing, a chemical agent such as IPA or a solvent having a surfactant added thereto is supplied in the form of a mist or a vapor toward the substrate under the state that the substrate is stopped or rotated at a low speed after processing with a chemical agent and a subsequent rinsing processing with a pure water. After the supply of the chemical agent is stopped, the substrate is rotated at a rotating speed higher than said low speed so as to centrifugally remove the chemical agent attached to the substrate.

10 Claims, 13 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 10

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|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KIMC | Draw De |
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☐ 8. Document ID: US 6575178 B1

L7: Entry 8 of 17

File: USPT

Jun 10, 2003

US-PAT-NO: 6575178

DOCUMENT-IDENTIFIER: US 6575178 B1

TITLE: Cleaning and drying method and apparatus

DATE-ISSUED: June 10, 2003

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|----------------|-------------|-------|----------|---------|
| Kamikawa; Yuji | Koshi-machi | | | JP |

US-CL-CURRENT: [134/88](#); [134/102.3](#), [134/105](#), [134/158](#), [134/183](#), [134/200](#), [134/902](#),
[257/E21.229](#)

ABSTRACT:

An enclosure 23A that defines a drying chamber 23 is configured of a pair of enclosing elements 23c and 23d and a base element 23b. When wafers enter or leave the drying chamber 23, the enclosing elements 23c and 23d are lifted upward by vertical air cylinders 42 to separate them from the base element 23b. The enclosing elements 23c and 23d are then moved in directions that mutually separate them. To dry wafers within the drying chamber 23, the enclosing elements and the base element 23b are mutually engaged to form a hermetic seal, in the opposite sequence.

The present invention reduces the dimensions of the drying chamber without impeding the work of moving wafers into and out of the drying chamber. This makes it possible to reduce the internal volume of the drying chamber, achieving a reduction in the consumption of drying gas, an improvement in the drying efficiency, and a reduction in overall size of the apparatus.

12 Claims, 28 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 19

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequence | Attachment | Claims | KMC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|----------|------------|--------|-----|---------|
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☐ 9. Document ID: US 6517697 B1

L7: Entry 9 of 17

File: USPT

Feb 11, 2003

US-PAT-NO: 6517697

DOCUMENT-IDENTIFIER: US 6517697 B1

**** See image for Certificate of Correction ****

TITLE: Anodizing method

DATE-ISSUED: February 11, 2003

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|-----------------|------------|-------|----------|---------|
| Yamagata; Kenji | Sagamihara | | | JP |

US-CL-CURRENT: [205/147](#); [134/26](#), [156/230](#), [205/157](#), [257/E21.288](#)

ABSTRACT:

A holder (102) made from an HF-resistant material includes annular suction pads (105, 108). The suction pad (105) is used to hold a small silicon substrate by suction, and the suction pad (108) is used to hold a large silicon substrate by suction. This makes silicon substrates with various sizes processable. A silicon substrate is held by suction by reducing a pressure in a space in a groove of the suction pad by a pump (120). An opening (103) is formed in the holder (102) so that the both surfaces of the silicon substrate are brought into contact with an HF solution (115). The silicon substrate is anodized by applying a DC voltage by using

a platinum electrode (109a) as a negative electrode and a platinum electrode (109b) as a positive electrode, and thereby a substrate having a porous layer is produced.

12 Claims, 43 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 38

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
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☐ 10. Document ID: US 6375758 B2

L7: Entry 10 of 17

File: USPT

Apr 23, 2002

US-PAT-NO: 6375758

DOCUMENT-IDENTIFIER: US 6375758 B2

TITLE: Cleaning and drying method and apparatus for objects to be processed

DATE-ISSUED: April 23, 2002

INVENTOR-INFORMATION:

| NAME | CITY | STATE | ZIP CODE | COUNTRY |
|--------------------|---------------|-------|----------|---------|
| Nakashima; Satoshi | Kikusui-machi | | | JP |
| Kamikawa; Yuji | Koshi-machi | | | JP |
| Honda; Kazuyuki | Tosu | | | JP |

US-CL-CURRENT: 134/30; 134/2, 134/21, 134/26, 134/32, 134/902

ABSTRACT:

A cleaning and drying apparatus includes a cleaning bath 22 for collecting cleaning liquid and also discharging the liquid, a drying chamber 23 arranged above the cleaning bath 22 and a wafer boat 24 for conveying semiconductor wafers W between the cleaning bath 22 and the drying chamber 23. Dry gas nozzles 37 for ejecting dry gas are provided in the drying chamber 23. A shutter 36 is arranged between the cleaning bath 22 and the drying chamber 23, for insulating the cleaning bath 22 from the drying chamber 23. A central processing unit 60 controls respective operations of the dry gas nozzles 37 and a driving unit 52 for the shutter 36. With the arrangement, after the wafers W have been cleaned in the cleaning bath 22, the cleaning liquid is discharged through a bottom of the bath 22, while the dry gas is supplied from the dry gas nozzles 37 to contact with surfaces of the wafers W and the cleaning liquid in a first drying process. Next, a second drying process is carried out due to condensation of the cleaning liquid on the wafers and the dry gas. In this way, the improvement in drying efficiency and the reduction of consumed dry gas can be accomplished.

13 Claims, 21 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 10

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De |
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| Term | Documents |
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| SECOND | 3265361 |
| SECONDS | 463075 |
| DRYING | 409273 |
| DRYINGS | 376 |
| (5 AND (SECOND ADJ DRYING)).PGPB,USPT. | 17 |
| (L5 AND (SECOND ADJ DRYING)).PGPB,USPT. | 17 |

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☐ 1. Document ID: JP 2002110612 A

L9: Entry 1 of 10

File: JPAB

Apr 12, 2002

PUB-NO: JP02002110612A

DOCUMENT-IDENTIFIER: JP 2002110612 A

TITLE: CLEANING TREATMENT METHOD AND APPARATUS

PUBN-DATE: April 12, 2002

INVENTOR-INFORMATION:

NAME

COUNTRY

ORII, TAKEHIKO

NAKAMORI, MITSUNORI

INT-CL (IPC): H01 L 21/304; B08 B 3/02; B08 B 3/08

ABSTRACT:

PROBLEM TO BE SOLVED: To provide cleaning treatment method and device for efficiently supplying a chemical agent onto a substrate surface for inhibiting the amount of consumption of the chemical agent, and a water treatment method for reducing cleaning marks (watermarks) that are generated on the substrate surface.

SOLUTION: Drying treatment, using the chemical agent in the cleaning treatment of a semiconductor wafer W retained in a treatment chamber comprising outside and inside chambers 26 and 27, is carried out by chemical agent supply and first and second drying treatment processes. In the chemical agent supply process, the mist- or vapor-like chemical agent is supplied toward the semiconductor wafer W, while the semiconductor wafer W is being stopped or being rotated at a low speed. In the first drying treatment process, the semiconductor wafer W is rotated at an intermediate speed to prevent the chemical agent shaken out of the semiconductor wafer W from splashing from the treatment chamber, when the supply of the chemical agent is stopped and the semiconductor wafer W is rotated. In the second drying treatment process, the semiconductor wafer W is rotated at a high speed for shaking out the chemical agent adhering to the semiconductor wafer W.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequence | Attachment | Claims | KMIC | Draw De |
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☐ 2. Document ID: JP 11097407 A

L9: Entry 2 of 10

File: JPAB

Apr 9, 1999

PUB-NO: JP411097407A
DOCUMENT-IDENTIFIER: JP 11097407 A
TITLE: WAFER DRYING EQUIPMENT

PUBN-DATE: April 9, 1999

INVENTOR-INFORMATION:

NAME

COUNTRY

KAMIYAMA, TSUTOMU

INT-CL (IPC): H01 L 21/304

ABSTRACT:

PROBLEM TO BE SOLVED: To completely dry a wafer, by jetting a gas to the surface of the wafer while it is being transferred by the gas jetting means of a first drying part, and supplying the gas by the gas supply means of a second drying part over a prescribed transfer area.

SOLUTION: In a first drying part 8, a gas is jetted to the upper and lower planes of a wafer, which is being transferred by a transfer mechanism 6, through gas jetting ports 20a and 21a of a first and a second air knives 20 and 21, and a cleaning solution is removed by being blown away. The drying by the first drying part 8 is the preliminary drying and there is no need for specially increasing the jetting quantity of the gas nor reducing the transfer speed of the wafer. In a second drying part 9, while the gas is supplied from a punched hole 37 at bottom parts 30a and 31a of a first and a second gas supply parts 30 and 31, the wafer is passed through the second drying part 9 at a fixed transfer speed so as to remove the remaining cleaning solution at the molecular level and completely dry the wafer W.

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|------|-------|----------|-------|--------|----------------|------|-----------|----------|------------|--------|------|----------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequence | Attachment | Claims | KWIC | Drawings |
|------|-------|----------|-------|--------|----------------|------|-----------|----------|------------|--------|------|----------|

☐ 3. Document ID: JP 08148450 A

L9: Entry 3 of 10

File: JPAB

Jun 7, 1996

PUB-NO: JP408148450A
DOCUMENT-IDENTIFIER: JP 08148450 A
TITLE: WASHING METHOD OF SILICON SLUDGE OF SEMICONDUCTOR WAFER

PUBN-DATE: June 7, 1996

INVENTOR-INFORMATION:

NAME

COUNTRY

SEKIDA, SABURO

KAWASHIMA, ISAMU

INT-CL (IPC): H01 L 21/304; H01 L 21/306

ABSTRACT:

PURPOSE: To obtain a washing method in which the adhesion of silicon sludge to a ground semiconductor wafer can be prevented and also the stain, the trace and the cloud and the like of solution are not left by a method wherein a semiconductor wafer rotating process and the brush-washing process of the secondary drying process are combindly and simultaneously used immediately after the first drying process.

CONSTITUTION: In the first drying process, a semiconductor wafer W is dried up by discharging low pressure dry air to the semiconductor wafer by operating a dry air discharging means 9. In a semiconductor wafer rotating process, the semiconductor wafer is rotated by operating a rotating shaft 2 and a rotating means 3. In the second drying process, the semiconductor wafer W is dried up by discharging high pressure dry air to the semiconductor wafer W by operating a dry air discharging means 9. In a brush washing process, a pair of upper and lower brushes 5 are rotated by operating a brush rotating means 6, and the rotating brushes 5 are advanced or retreated by operating a brush advancing/retreating means 7. At this point, the semiconductor wafer rotating process, the second drying process and the brush washing process are combindly used immediately after the first drying process.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KIMC | Draw. De |
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☐ 4. Document ID: JP 56103440 A

L9: Entry 4 of 10

File: JPAB

Aug 18, 1981

PUB-NO: JP356103440A

DOCUMENT-IDENTIFIER: JP 56103440 A

TITLE: APPARATUS FOR TREATING SEMICONDUCTOR SUBSTRATE

PUBN-DATE: August 18, 1981

INVENTOR-INFORMATION:

NAME

COUNTRY

IMANAKA, SEIJI

US-CL-CURRENT: 134/25.4

INT-CL (IPC): H01L 21/68; H01L 21/02

ABSTRACT:

PURPOSE: To prevent contamination and damage of a semiconductor substrate by automatically washing and drying it with means of feeding, thrusting, turning, receiving and conveying.

CONSTITUTION: A cassette 2 housing a substrate 1 is moved on a conveyor 32 in a water tank 34 and positioned with a knob after rinsing. The groove 3 of the cassette aligns a V grooves on guides 12 and 13 and when thrustured with a plate 11, one substrate turns the guides by its own gravity until it stops with a pin 15a of a stopper 14a. Then, a dry air is blown for a fixed time from tubes 16a~16c and a stopper 14 is driven to retreat a sticking pin 15a of a pin 15b to the second drying position where similar drying is performed repeatedly. After dried, the substrate is passed through a clearance of a shield plate 20 and housed into a

groove of a cassette 2 previously raised. Then, the cassette 2 in the water tank 34 is moved by one pitch. The empty cassette is discharged with a conveyor 32 while the filled cassette is returned onto a conveyor 22 and discharged.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De |
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☐ 5. Document ID: EP 886301 A2

L9: Entry 5 of 10

File: EPAB

Dec 23, 1998

PUB-NO: EP000886301A2

DOCUMENT-IDENTIFIER: EP 886301 A2

TITLE: Cleaning and drying method and apparatus for objects to be processed

PUBN-DATE: December 23, 1998

INVENTOR-INFORMATION:

NAME

COUNTRY

NAKASHIMA, SATOSHI

JP

KAMIKAWA, YUJI

JP


HONDA, KAZUYUKI

JP

INT-CL (IPC): H01 L 21/00

EUR-CL (EPC): H01L021/00

ABSTRACT:

CHG DATE=19990905 STATUS=O> A cleaning and drying apparatus includes a cleaning bath 22 for collecting cleaning liquid and also discharging the liquid, a drying chamber 23 arranged above the cleaning bath 22 and a wafer boat 24 for conveying semiconductor wafers W between the cleaning bath 22 and the drying chamber 23. Dry gas nozzles 37 for ejecting dry gas are provided in the drying chamber 23. A shutter 36 is arranged between the cleaning bath 22 and the drying chamber 23, for insulating the cleaning bath 22 from the drying chamber 23. A central processing unit 60 controls respective operations of the dry gas nozzles 37 and a driving unit 52 for the shutter 36. With the arrangement, after the wafers W have been cleaned in the cleaning bath 22, the cleaning liquid is discharged through a bottom of the bath 22, while the dry gas is supplied from the dry gas nozzles 37 to contact with surfaces of the wafers W and the cleaning liquid in a first drying process. Next, a second drying process is carried out due to condensation of the cleaning liquid on the wafers and the dry gas. In this way, the improvement in drying efficiency and the reduction of consumed dry gas can be accomplished. 

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|----------|
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☐ 6. Document ID: KR 2004040754 A

L9: Entry 6 of 10

File: DWPI

May 13, 2004

DERWENT-ACC-NO: 2004-611739
DERWENT-WEEK: 200459
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TITLE: Wafer drying method and apparatus

INVENTOR: JANG, S G; KWON, Y G ; LEE, U G ; PARK, Y C

PRIORITY-DATA: 2002KR-0068982 (November 8, 2002)

PATENT-FAMILY:

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|-----------------|--------------|----------|-------|-------------|
| KR 2004040754 A | May 13, 2004 | | 001 | H01L021/304 |

INT-CL (IPC): H01 L 21/304

ABSTRACTED-PUB-NO: KR2004040754A

BASIC-ABSTRACT:

NOVELTY - A wafer drying method and its apparatus are provided to be capable of preventing the generation of water spot and particle due to the contact between a wafer and a support part under a wafer drying process.

DETAILED DESCRIPTION - A wafer is vertically loaded in a container(S100). Both sides of the wafer are supported(S200). The first drying process is performed on the wafer(S300). The lower portion of the wafer is supported and the support for both sides of the wafer is dissolved(S400). The second drying process is performed on the wafer(S500). Then, the wafer is unloaded from the container(S600). Preferably, a rinsing process is carried out before the first drying process(S210). Preferably, deionized water is stored in the container when loading the wafer in the container, so that the rinsing process is performed by using the deionized water.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | References | Attachments | Claims | RWC | Drawings |
|------|-------|----------|-------|--------|----------------|------|-----------|------------|-------------|--------|-----|----------|
|------|-------|----------|-------|--------|----------------|------|-----------|------------|-------------|--------|-----|----------|

☐ 7. Document ID: JP 2001005170 A

L9: Entry 7 of 10

File: DWPI

Jan 12, 2001

DERWENT-ACC-NO: 2001-573454
DERWENT-WEEK: 200165
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TITLE: Drying of pellicle frame used in lithography processing, involves immersing pellicle frame in pure water maintained at preset temperature and pulling up frame vertically above water surface at fixed preset rate

PRIORITY-DATA: 1999JP-0172378 (June 18, 1999)

PATENT-FAMILY:

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|-----------------|------------------|----------|-------|------------|
| JP 2001005170 A | January 12, 2001 | | 007 | G03F001/14 |

INT-CL (IPC): B08 B 3/04; G03 F 1/14; H01 L 21/027

ABSTRACTED-PUB-NO: JP2001005170A

BASIC-ABSTRACT:

NOVELTY - The pellicle frame (2) cleaned in water-base cleaner is immersed into pure water (1a) whose temperature is maintained at 30-95 deg. C. The immersed pellicle frame is then pulled up vertically above the water surface at the rate of 0.5-10 mm per second, for drying the frame using infrared rays and air.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for pellicle frame drying apparatus.

USE - For drying pellicle frame used in pellicle for lithography processing employed for manufacturing LSI, VLSI, semiconductor device and liquid crystal display.

ADVANTAGE - Since the pellicle frame is pulled up from the pure water at predetermined rate, droplets of water in the frame is removed due to the surface tension and after drying the frame using infrared rays and air, a high quality and clean pellicle frame is obtained.

DESCRIPTION OF DRAWING(S) - The figure shows the front elevation and side view of pellicle frame drying apparatus.

Pure water 1a

Pellicle frame 2

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KOMIC | Draw De |
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☐ 8. Document ID: TW 393351 A

L9: Entry 8 of 10

File: DWPI

Jun 11, 2000

DERWENT-ACC-NO: 2001-167278

DERWENT-WEEK: 200117

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TITLE: Method for cleansing wafers, containing two steps where the first drying step is performed at the vaporizing and drying bays but the second drying step is performed at the loading/unloading device

INVENTOR: CHEN, K; CHEN, W ; JUANG, D

PRIORITY-DATA: 1998TW-0108702 (June 3, 1998)

PATENT-FAMILY:

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|--------------------|---------------|----------|-------|------------|
| <u>TW 393351 A</u> | June 11, 2000 | | 000 | B08B003/04 |

INT-CL (IPC): B08 B 3/04

ABSTRACTED-PUB-NO: TW 393351A

BASIC-ABSTRACT:

NOVELTY - This invention relates to a method for cleansing wafers, and, more specifically, to a method in the vaporing and drying bays processes. The drying process contains two steps: the first drying step is performed at the above vaporing and drying bays, the second step, however, is performed at the loading/unloading device. Although the duration for the whole drying process may be the same as or even longer than the known method, the new process is capable of reducing the time the wafers need to stay in the vaporing and drying bays, so that the wafers transported from the third cleaning tank after the cleansing process is finished will be handled in an effective way and time spent in waiting for the vaporing and drying bays will be reduced.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KMC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|-----|---------|

☐ 9. Document ID: KR 411366 B, EP 886301 A2, JP 11008218 A, KR 99007018 A, JP 3151613 B2, US 20010007259 A1, US 6375758 B2

L9: Entry 9 of 10

File: DWPI

Feb 14, 2004

DERWENT-ACC-NO: 1999-037318

DERWENT-WEEK: 200441

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TITLE: Cleaning and drying method for e.g. semiconductor wafer - by draining cleaning liquid while wafer is fixed in chamber and contacting dry gas to wafer to dry before moving to drying chamber and contacting wafer with second dry gas

INVENTOR: HONDA, K; KAMIKAWA, Y ; NAKASHIMA, S

PRIORITY-DATA: 1997JP-0175134 (June 17, 1997)

PATENT-FAMILY:

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|--------------------------|-------------------|----------|-------|-------------|
| <u>KR 411366 B</u> | February 14, 2004 | | 000 | H01L021/304 |
| <u>EP 886301 A2</u> | December 23, 1998 | E | 019 | H01L021/00 |
| <u>JP 11008218 A</u> | January 12, 1999 | | 011 | H01L021/304 |
| <u>KR 99007018 A</u> | January 25, 1999 | | 000 | H01L021/304 |
| <u>JP 3151613 B2</u> | April 3, 2001 | | 011 | H01L021/304 |
| <u>US 20010007259 A1</u> | July 12, 2001 | | 000 | B08B001/02 |
| <u>US 6375758 B2</u> | April 23, 2002 | | 000 | B08B003/00 |

INT-CL (IPC): B08 B 1/02; B08 B 3/00; B08 B 3/04; H01 L 21/00; H01 L 21/304

ABSTRACTED-PUB-NO: EP 886301A

BASIC-ABSTRACT:

The cleaning and drying method involves supplying dry gas into the cleaning chamber (22) after cleaning the object. The cleaning liquid is drained under condition that the object is fixed in the cleaning chamber while the dry gas is contacted with the object to dry the object in a first drying process.

The object is moved to the drying chamber (23) after the first drying process. Dry gas is sequentially supplied into the drying chamber to dry the object in a second drying process. Both the dry gas used in the first drying process and the dry gas used in the second drying process contain volatile organic solvent. The dry gas

used in the second drying process may be inert gas.

USE - Also for liquid crystal display glass substrate.

ADVANTAGE - Improves drying efficiency. Reduces dry gas consumption.

ABSTRACTED-PUB-NO:

US 6375758B EQUIVALENT-ABSTRACTS:

The cleaning and drying method involves supplying dry gas into the cleaning chamber (22) after cleaning the object. The cleaning liquid is drained under condition that the object is fixed in the cleaning chamber while the dry gas is contacted with the object to dry the object in a first drying process.

The object is moved to the drying chamber (23) after the first drying process. Dry gas is sequentially supplied into the drying chamber to dry the object in a second drying process. Both the dry gas used in the first drying process and the dry gas used in the second drying process contain volatile organic solvent. The dry gas used in the second drying process may be inert gas.

USE - Also for liquid crystal display glass substrate.

ADVANTAGE - Improves drying efficiency. Reduces dry gas consumption.

US20010007259A

The cleaning and drying method involves supplying dry gas into the cleaning chamber (22) after cleaning the object. The cleaning liquid is drained under condition that the object is fixed in the cleaning chamber while the dry gas is contacted with the object to dry the object in a first drying process.

The object is moved to the drying chamber (23) after the first drying process. Dry gas is sequentially supplied into the drying chamber to dry the object in a second drying process. Both the dry gas used in the first drying process and the dry gas used in the second drying process contain volatile organic solvent. The dry gas used in the second drying process may be inert gas.

USE - Also for liquid crystal display glass substrate.

ADVANTAGE - Improves drying efficiency. Reduces dry gas consumption.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | RWMC | Drawn De |
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|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|----------|

☐ 10. Document ID: JP 05121333 A, US 5342471 A, KR 184677 B1

L9: Entry 10 of 10

File: DWPI

May 18, 1993

DERWENT-ACC-NO: 1993-192965

DERWENT-WEEK: 200321

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TITLE: Plasma processing appts. for semiconductor wafers - comprises electrodes, RF applying means, cooling means, etc. and prevents condensn. during cooling and RF leakage

INVENTOR: FUKASAWA, K; SUETSUGU, M

PRIORITY-DATA: 1991JP-0090401 (April 22, 1991)

PATENT-FAMILY:

| PUB-NO | PUB-DATE | LANGUAGE | PAGES | MAIN-IPC |
|----------------------|-----------------|----------|-------|-------------|
| <u>JP 05121333 A</u> | May 18, 1993 | | 004 | H01L021/205 |
| <u>US 5342471 A</u> | August 30, 1994 | | 009 | B44C001/22 |
| <u>KR 184677 B1</u> | April 15, 1999 | | 000 | H01L021/42 |

INT-CL (IPC): B44C 1/22; H01L 21/205; H01L 21/302; H01L 21/31; H01L 21/42

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|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KIMC | Draw De |
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| Term | Documents |
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| SECOND | 2037634 |
| SECONDS | 40148 |
| DRYING | 316436 |
| DRYINGS | 28 |
| ((SECOND ADJ DRYING) AND 8).EPAB,JPAB,DWPI,TDBD. | 10 |
| (L8 AND (SECOND ADJ DRYING)).EPAB,JPAB,DWPI,TDBD. | 10 |

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